10 QUANTITATION

10.1 Objectives

10.1.1 Generate accurate and precise quantitative results.

10.1.2 Demonstrate techniques used for the quantitative determination of various drugs.

10.1.3 Construct and apply calibration curves using internal or external standards.

10.1.4 Understand and explain the criteria for acceptance of quantitative data.

10.1.5 Demonstrate a working knowledge of reporting quantitative results in the manner used in the toxicology section.

10.2 Estimated Time: One Month

10.3 Methods of Instruction

10.3.1 Lecture

10.3.1.1 Use of calibrators, controls and standards

10.3.1.2 Software calibration

10.3.1.3 Generating calibration curves

10.3.1.4 LOD, LOQ, ULOL, LLOL

10.3.1.5 Quality control

10.3.1.6 Statistical procedures

10.3.1.7 Reporting of quantitative results

10.3.2 Literature Review

10.3.2.1 Toxicology Technical Procedures Manual

10.3.2.2 Agilent Technologies GCMS Instrument Manuals

10.3.2.3 HP6890 Series GC Operating Manual

10.3.2.4 Taylor, J.K. *Quality Assurance of Chemical Measurements*. 1987, Lewis Publishers, US.

10.3.2.5 Willard, H.H., Merritt, L.L.H., Dean, J. and F.A. Settle. *Instrumental Methods of Analysis*, 7th Ed., 1988, Wadsworth Pub Co, pp 540-578.

10.3.3 Demonstration

10.3.3.1 Techniques used to quantitate drugs will be observed from beginning to end and notes will be taken by the Trainee.

10.3.4 Laboratory Exercises

10.3.4.1 Determine the concentrations of two basic drugs in one batch of 15 blood specimens using gas chromatography. At least 10 of the specimens will be positive for at least one drug and at least one specimen will be negative.

10.3.4.2 Determine the concentrations of benzodiazepines in one batch of 15 blood specimens using the GC/ECD. At least 10 of the specimens will be positive for at least one drug and at least one specimen will be negative.

10.3.4.3 Determine the concentrations of cocaine, cocaethylene and benzoylecgonine in one batch of 15 blood specimens using GCMS. At least 10 of the specimens will be positive for at least one drug and at least one specimen will be negative.

10.4 Evaluation

10.4.1 Written Exam

10.4.1.1 This will be administered as a “take home” exam.

10.4.2 Laboratory Competency Testing

10.4.2.1 Quantitation using GC/NPD – 5 previously analyzed cases will be presented to the trainee for quantitation.

10.4.2.2 Quantitation using GC/ECD – 5 previously analyzed blood specimens will be presented to the trainee for the quantitation of benzodiazepines.

10.4.2.3 Quantitation using GC/MS – 5 previously analyzed blood specimens will be presented to the trainee for the quantitation of cocaine, cocaethylene and benzoylecgonine.

10.4.3 Courtroom Exercise

10.4.3.1 The Trainee must be capable of answering questions on this Module such as would be expected in a courtroom scenario.

10.5 Examination Questions

10.5.1 Define and explain the following:

10.5.1.1 Blank

10.5.1.2 Internal standard

10.5.1.3 External standard

10.5.1.4 Control

10.5.1.5 Calibrator

10.5.2 Define and explain the following:

10.5.2.1 Limit of detection (LOD)

10.5.2.2 Limit of quantitation (LOQ)

10.5.2.3 Upper limit of linearity (ULOL)

10.5.2.4 Lower limit of linearity (LLOL)

10.5.3 Describe the calibration curve used in the ethanol assay:

10.5.3.1 Curve generation

10.5.3.2 Acceptance criteria

10.5.3.3 Within run variability

♦ **End**